README for CSE 464
Project Part 2

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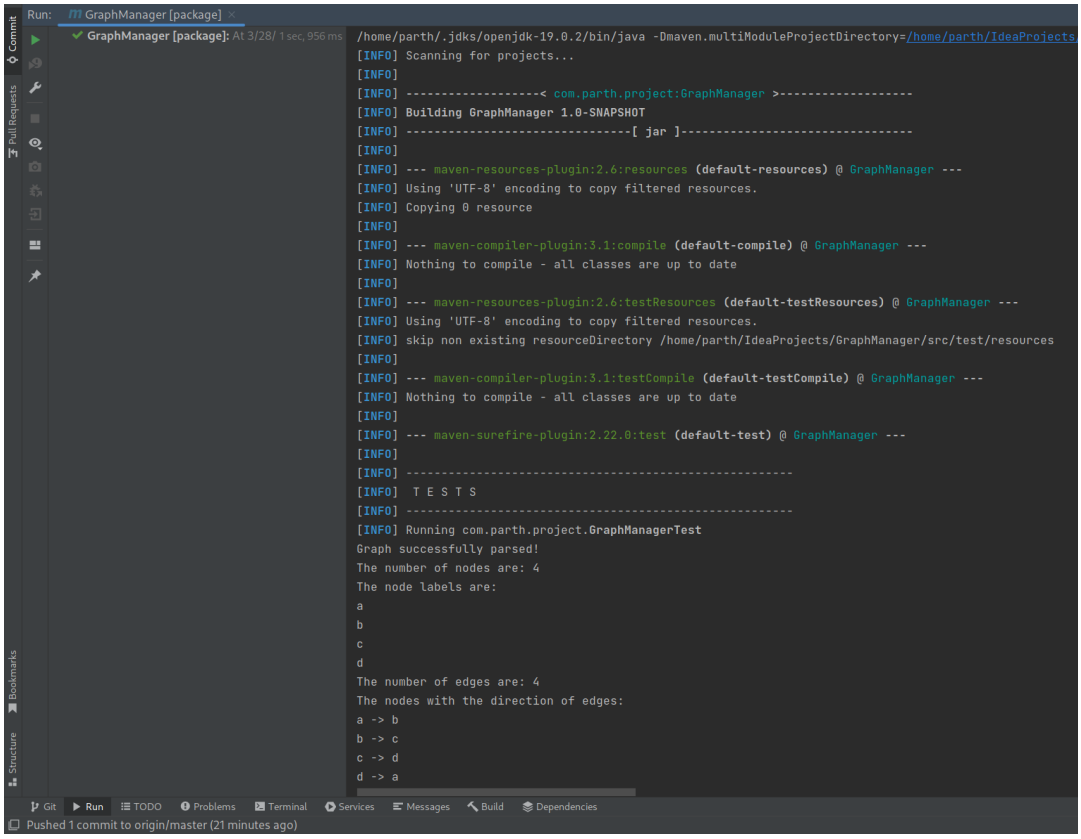
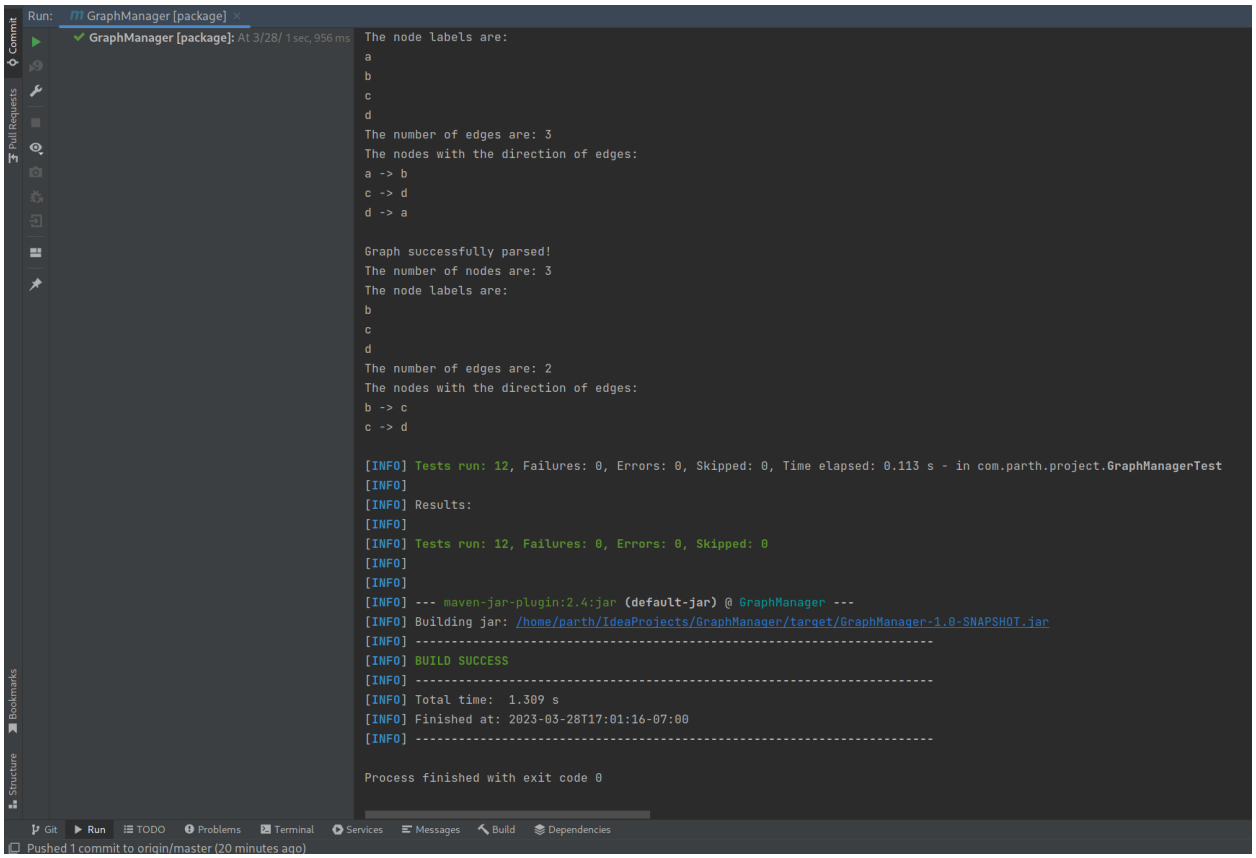
GitHub Repository link: https://github.com/Parth576/CSE-464-2023-prshah11

1. **Adding Maven support to the project**

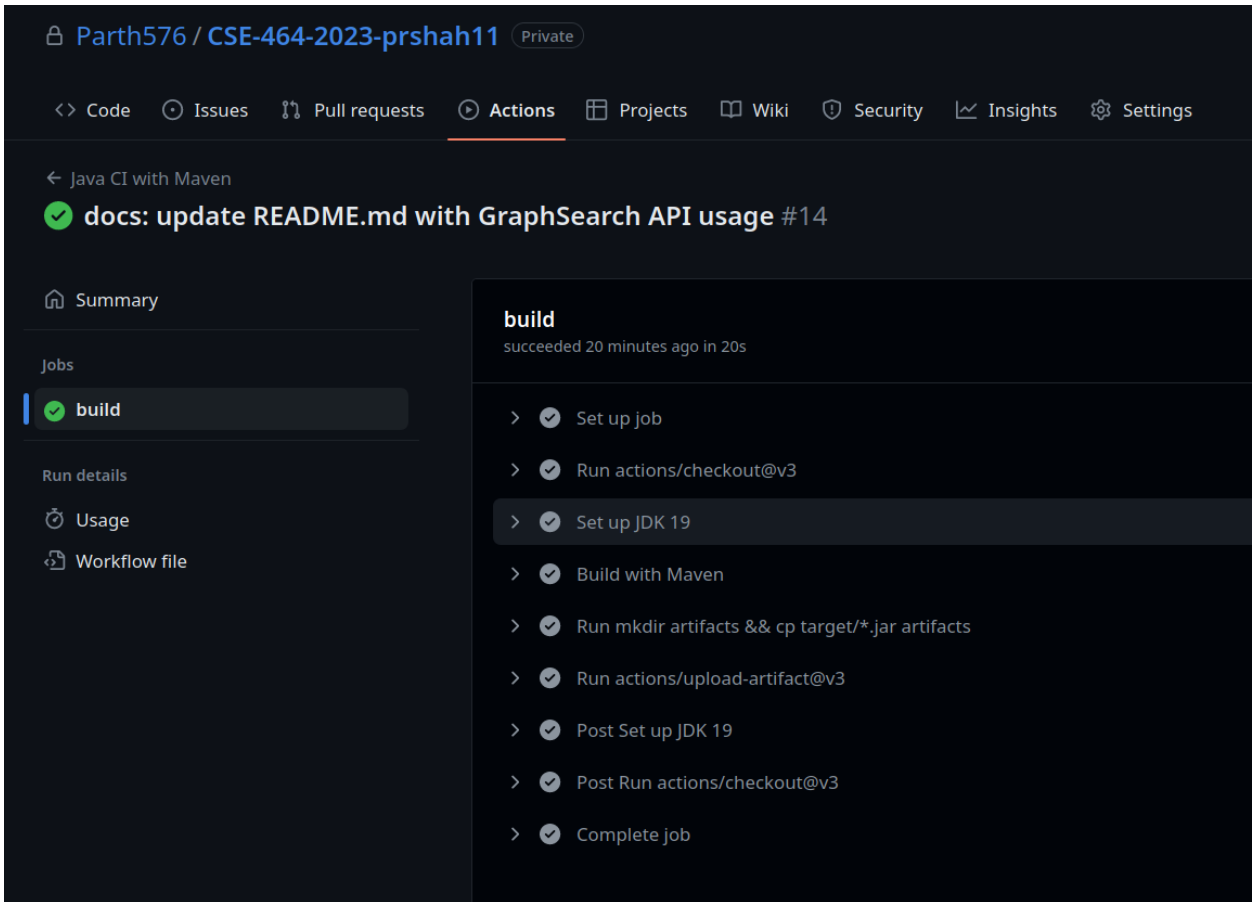
    - I was following the standard directory layout from when I had started my project by following the guide at https://maven.apache.org/guides/introduction/introduction-to-the-standard-directory-layout.html
    - I created a pom.xml and added all my project dependencies. The commit which contains this change: https://github.com/Parth576/CSE-464-2023-prshah11/commit/10300a57f930b1adc58d8c1d556a570c4f81b5b4
    - A later commit fixed the tests not running while executing the mvn package command in which the version for maven-surefire-plugin needed to by changed to 2.22.0: https://github.com/Parth576/CSE-464-2023-prshah11/commit/50798fb2fe3c5b7b79b20df3f6ce5a2653874430
    - Output for mvn package command

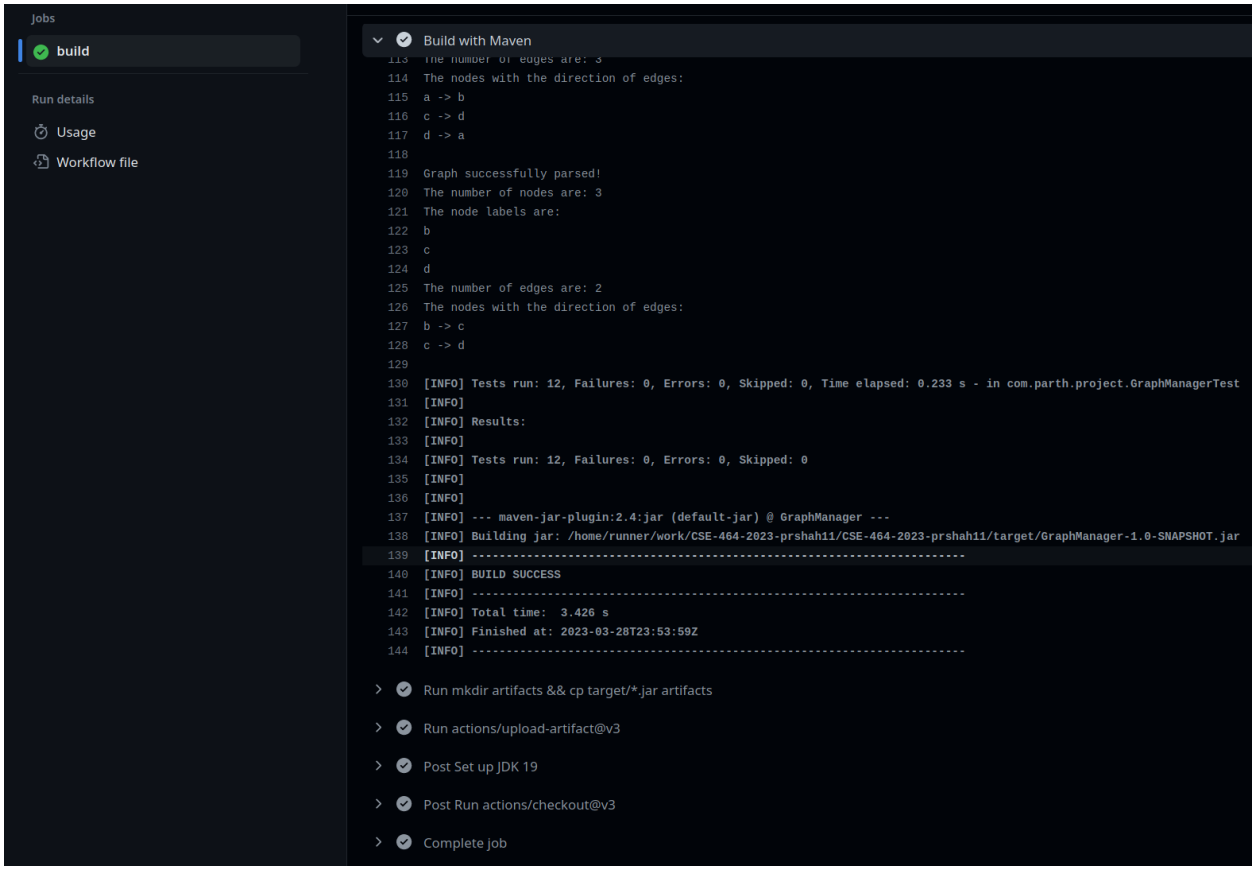

Run: GraphManager [package]
GraphManager [package]: At 3/28/ 1 sec, 956 ms
/home/parth/.jdks/openjdk-19.0.2/bin/java -Dmaven.multiModuleProjectDirectory=/home/parth/IdeaProjects
[INFO] Scanning for projects...
[INFO]
[INFO] ------------------< com.parth.project:GraphManager >------------------
[INFO] Building GraphManager 1.0-SNAPSHOT
[INFO] --------------------------------[jar]---------------------------------
[INFO]
[INFO] --- maven-resources-plugin:2.6:resources (default-resources) @ GraphManager ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] Copying 0 resource
[INFO]
[INFO] --- maven-compiler-plugin:3.1:compile (default-compile) @ GraphManager ---
[INFO] Nothing to compile - all classes are up to date
[INFO]
[INFO] --- maven-resources-plugin:2.6:testResources (default-testResources) @ GraphManager ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] skip non existing resourceDirectory /home/parth/IdeaProjects/GraphManager/src/test/resources
[INFO]
[INFO] --- maven-compiler-plugin:3.1:testCompile (default-testCompile) @ GraphManager ---
[INFO] Nothing to compile - all classes are up to date
[INFO]
[INFO] --- maven-surefire-plugin:2.22.0:test (default-test) @ GraphManager ---
[INFO]
[INFO] ---
[INFO] T E S T S
[INFO] ---
[INFO] Running com.parth.project.GraphManagerTest
Graph successfully parsed!
The number of nodes are: 4
The node labels are:
a
b
c
d
The number of edges are: 4
The nodes with the direction of edges:
a -> b
b -> c
c -> d
d -> a
Git Run TODO Problems Terminal Services Messages Build Dependencies
Pushed 1 commit to origin/master (21 minutes ago)

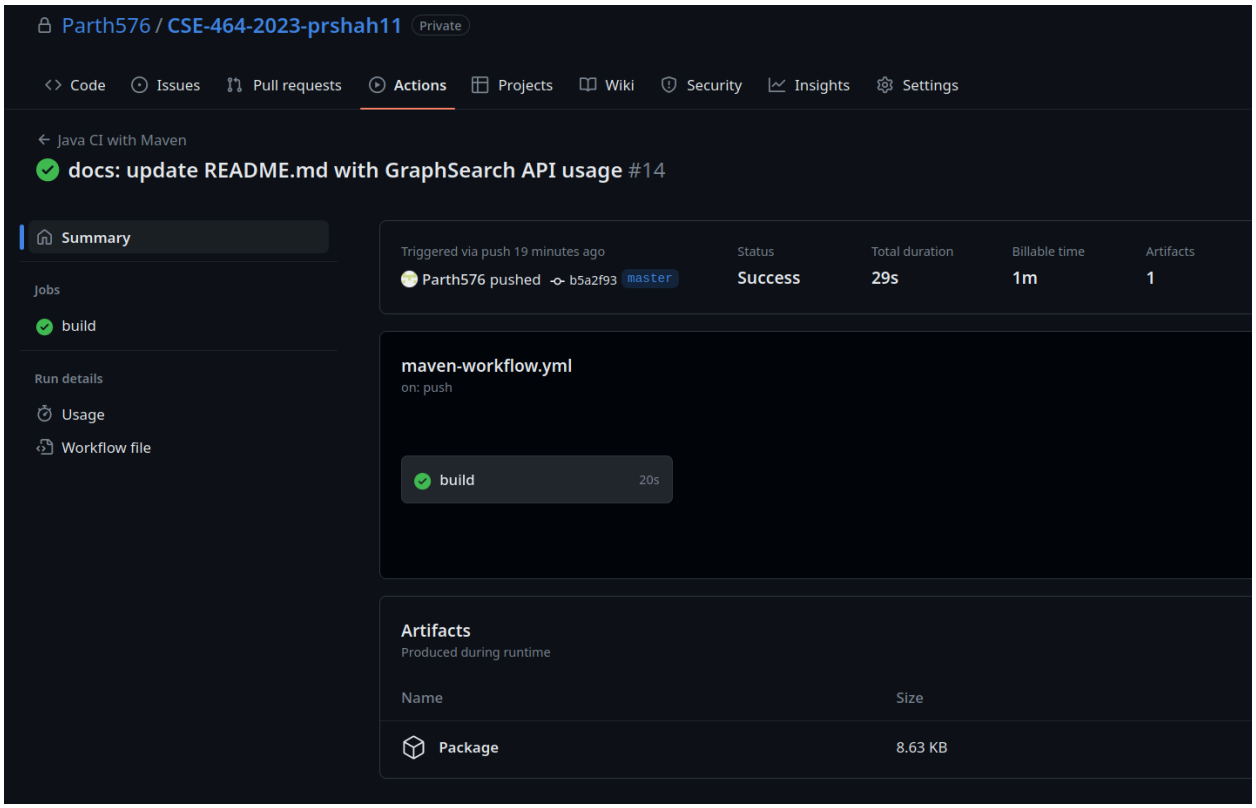

Run: GraphManager [package]
GraphManager [package]: At 3/28/ 1 sec, 956 ms
The node labels are:
a
b
c
d
The number of edges are: 3
The nodes with the direction of edges:
a -> b
c -> d
d -> a
Graph successfully parsed!
The number of nodes are: 3
The node labels are:
b
c
d
The number of edges are: 2
The nodes with the direction of edges:
b -> c
c -> d
[INFO] Tests run: 12, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.113 s - in com.parth.project.GraphManagerTest
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 12, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO]
[INFO] --- maven-jar-plugin:2.4:jar (default-jar) @ GraphManager ---
[INFO] Building jar: /home/parth/IdeaProjects/GraphManager/target/GraphManager-1.0-SNAPSHOT.jar
[INFO] --
[INFO] BUILD SUCCESS
[INFO] --
[INFO] Total time: 1.309 s
[INFO] Finished at: 2023-03-28T17:01:16-07:00
[INFO] --
Process finished with exit code 0
Git Run TODO Problems Terminal Services Messages Build Dependencies
Pushed 1 commit to origin/master (20 minutes ago)

2. Adding Github CI to the project

- The initial commit where I added the workflow file to the repository is: https://github.com/Parth576/CSE-464-2023-prshah11/commit/6e3dad1f357fd797177a51534986482cde6678e4
- The workflow runs on every push to the main branch or when a new pull request is opened to the main branch
- The workflow runs the *mvn package* command. Additionally, the build artifacts (JAR file) is stored in the workflow as well, so that we can download the JAR file directly from the workflow. The commit for this is: https://github.com/Parth576/CSE-464-2023-prshah11/commit/e0560a078583d9cfd474e641d27ec44beca1d017
- Some screenshots to show the Github CI working and producing builds of the project




Jobs
build
Run details
Usage
Workflow file
Build with Maven
The number of edges are: 3
The nodes with the direction of edges:
a -> b
c -> d
d -> a
Graph successfully parsed!
The number of nodes are: 3
The node labels are:
b
c
d
The number of edges are: 2
The nodes with the direction of edges:
b -> c
c -> d
[INFO] Tests run: 12, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.233 s - in com.parth.project.GraphManagerTest
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 12, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO]
[INFO] --- maven-jar-plugin:2.4:jar (default-jar) @ GraphManager ---
[INFO] Building jar: /home/runner/work/CSE-464-2023-prshah11/CSE-464-2023-prshah11/target/GraphManager-1.0-SNAPSHOT.jar
[INFO] --
[INFO] BUILD SUCCESS
[INFO] --
[INFO] Total time: 3.426 s
[INFO] Finished at: 2023-03-28T23:53:59Z
[INFO] --
Run mkdir artifacts && cp target/*.jar artifacts
Run actions/upload-artifact@v3
Post Set up JDK 19
Post Run actions/checkout@v3
Complete job


Parth576 / CSE-464-2023-prshah11
Private
Code
Issues
Pull requests
Actions
Projects
Wiki
Security
Insights
Settings
Java CI with Maven
docs: update README.md with GraphSearch API usage #14
Summary
Jobs
build
Run details
Usage
Workflow file
Triggered via push 19 minutes ago
Parth576 pushed b5a2f93 master
Status
Success
Total duration
29s
Billable time
1m
Artifacts
1
maven-workflow.yml
on: push
build 20s
Artifacts
Produced during runtime
Name
Size
Package
8.63 KB

3. **Adding BFS algorithm**

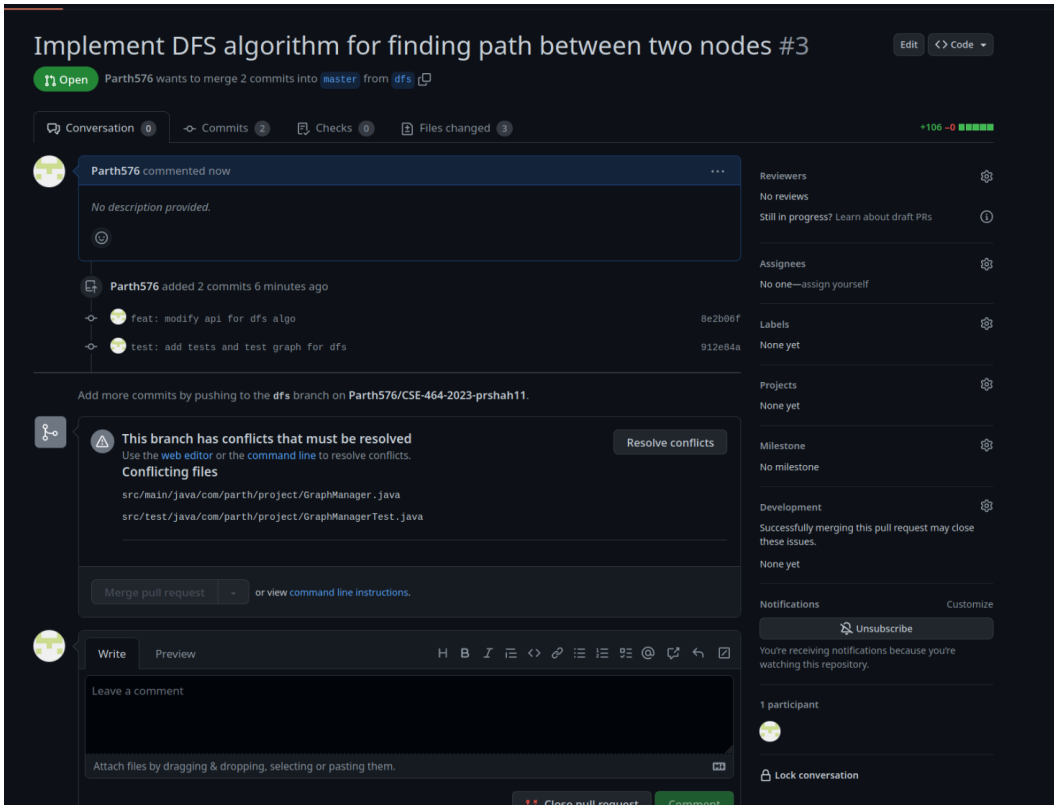
- I created a new API GraphSearch which returns an object of the class Path. It uses a BreadthFirstIterator from jgrapht.
- I created a separate branch ‘bfs’ https://github.com/Parth576/CSE-464-2023-prshah11/tree/bfs
- And then opened a pull request to merge the code from the bfs branch to master branch https://github.com/Parth576/CSE-464-2023-prshah11/pull/1
- The commit that added the BFS functionality is https://github.com/Parth576/CSE-464-2023-prshah11/pull/1/commits/9e3233078cd260f9da9acc8b34dfc2185123ba46
- I also added tests for this API in this commit : https://github.com/Parth576/CSE-464-2023-prshah11/pull/1/commits/aa31c569c8fffd49d3b9c410b6abee32187b27d1

4. **Adding DFS Algorithm**

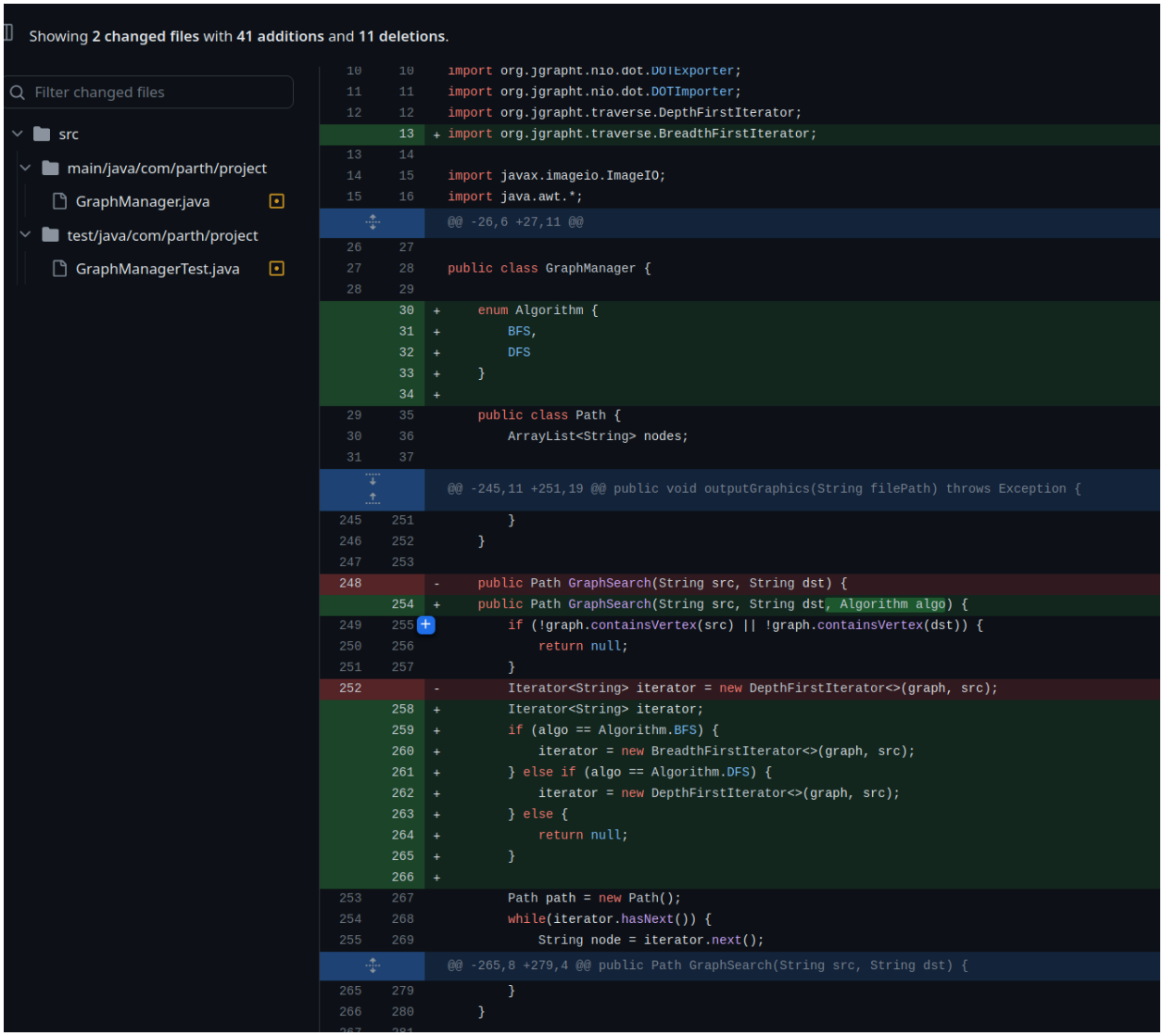
- I created a separate dfs branch from master which did the same changes but used a DepthFirstIterator https://github.com/Parth576/CSE-464-2023-prshah11/tree/dfs
- The pull request to merge this : https://github.com/Parth576/CSE-464-2023-prshah11/pull/3
- Commit that added DFS functionality: https://github.com/Parth576/CSE-464-2023-prshah11/pull/3/commits/8e2b06fcd1f908658bd90a1f0ee53ba531f14059

5. Merging to master and resolving merge conflicts

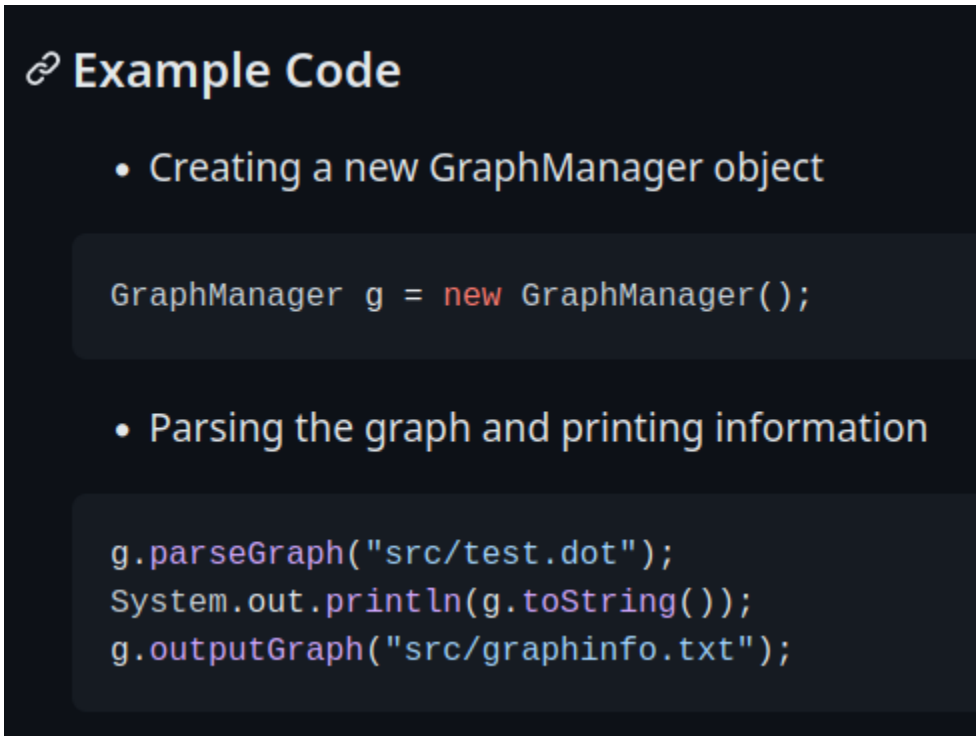
- I first merged the bfs branch to master
- Then we can see in this screenshot that I got a merge conflict on the pull request which merges dfs branch to master

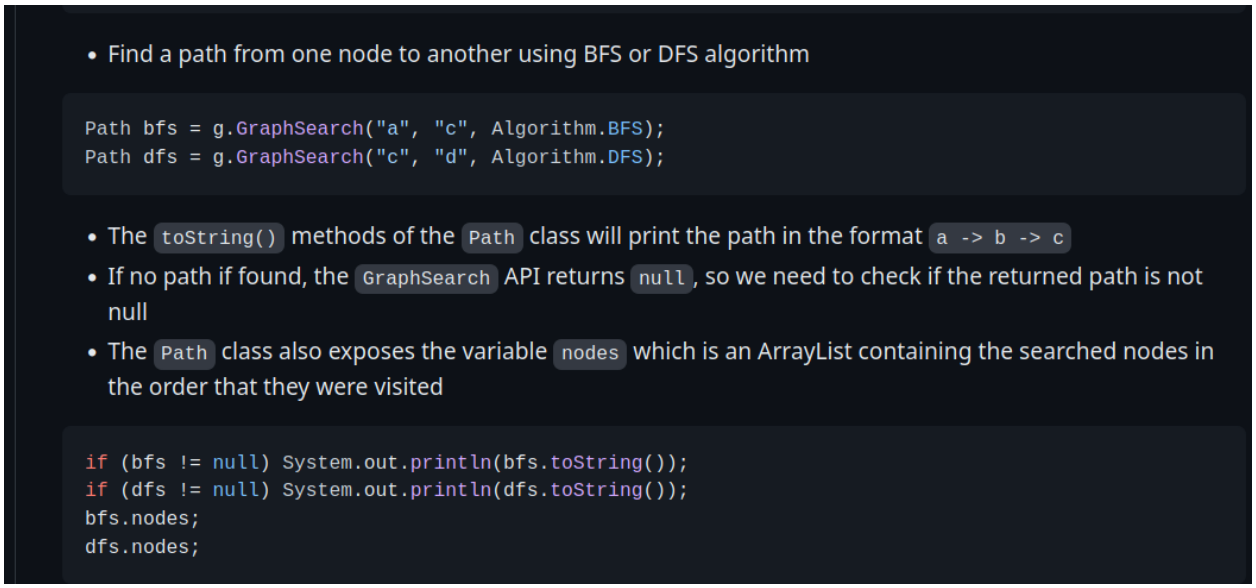


- I created an enum Algorithm and fixed the tests to resolve the merge conflict. The commit for that is : https://github.com/Parth576/CSE-464-2023-prshah11/commit/3d790c6a8f07a89681feca527ffe748a48a21bc2


Showing 2 changed files with 41 additions and 11 deletions.
Filter changed files
src
main/java/com/parth/project
GraphManager.java
test/java/com/parth/project
GraphManagerTest.java
import org.jgrapht.nio.dot.DOTExporter;
import org.jgrapht.nio.dot.DOTImporter;
import org.jgrapht.traverse.DepthFirstIterator;
+ import org.jgrapht.traverse.BreadthFirstIterator;
import javax.imageio.ImageIO;
import java.awt.*;
@@ -26,6 +27,11 @@
public class GraphManager {
+ enum Algorithm {
+ BFS,
+ DFS
+ }
+
public class Path {
ArrayList<String> nodes;
@@ -245,11 +251,19 @@ public void outputGraphics(String filePath) throws Exception {
}
}
- public Path GraphSearch(String src, String dst) {
+ public Path GraphSearch(String src, String dst, Algorithm algo) {
if (!graph.containsVertex(src) || !graph.containsVertex(dst)) {
return null;
}
- Iterator<String> iterator = new DepthFirstIterator<>(graph, src);
+ Iterator<String> iterator;
+ if (algo == Algorithm.BFS) {
+ iterator = new BreadthFirstIterator<>(graph, src);
+ } else if (algo == Algorithm.DFS) {
+ iterator = new DepthFirstIterator<>(graph, src);
+ } else {
+ return null;
+ }
+
Path path = new Path();
while(iterator.hasNext()) {
String node = iterator.next();
@@ -265,8 +279,4 @@ public Path GraphSearch(String src, String dst) {
}
}

6. **Instructions to run BFS and DFS (LINK)**





- There is an example in the test case for that as well

```java
@Test
public void testBFS() throws Exception {
    GraphManager gm = new GraphManager();
    gm.parseGraph("src/test2.dot");
    ArrayList<String> expected = new ArrayList<>();
    expected.add("a");
    expected.add("d");
    expected.add("c");
    expected.add("b");
    expected.add("h");
    String expectedString = "a -> d -> c -> b -> h";

    GraphManager.Path result = gm.GraphSearch("a", "h", GraphManager.Algorithm.BFS);

    assertNotNull(result);
    assertEquals(expected, result.nodes);
    assertEquals(expectedString, result.toString());

    result = gm.GraphSearch("h", "a", GraphManager.Algorithm.BFS);
    assertNull(result);
}

@Test
public void testDFS() throws Exception {
    GraphManager gm = new GraphManager();
    gm.parseGraph("src/test2.dot");
    ArrayList<String> expected = new ArrayList<>();
    expected.add("a");
    expected.add("b");
    expected.add("f");
    expected.add("e");
    expected.add("c");
    expected.add("g");
    expected.add("d");
    expected.add("i");
    expected.add("h");
    String expectedString = "a -> b -> f -> e -> c -> g -> d -> i -> h";

    GraphManager.Path result = gm.GraphSearch("a", "h", GraphManager.Algorithm.DFS);

    assertNotNull(result);
    assertEquals(expected, result.nodes);
    assertEquals(expectedString, result.toString());

    result = gm.GraphSearch("h", "a", GraphManager.Algorithm.DFS);
    assertNull(result);
}
```